

CLAIMS

1. A recording medium having video data, a plurality of programs, and a table recorded thereon, wherein

5 each of the plurality of programs shows a playback control procedure of the video data,

the table includes (1) identification information of each of the plurality of programs, and

(2) information showing that each of the plurality of
10 programs belongs to either a movie mode or an enhanced mode,

one of the plurality of programs includes a command for branching, and

the branching command specifies a branch
15 destination using indirect referencing via the table.

2. The recording medium of Claim 1, wherein

the table includes a plurality of indexes corresponding one-to-one with the plurality of programs,

20 the indexes show that the plurality of corresponding programs respectively belong to either the movie mode or the enhanced mode, and

the indirect referencing is to specify a program of the branch destination by using labels relating to
25 the indexes.

3. The recording medium of Claim 2, wherein

the indexes include a reserved index, and

the reserved index corresponds to a movie-mode
5 program used alternatively to an enhanced-mode program
when branching to the enhanced-mode program is
instructed in a playback device operable to execute
only the movie mode.

10 4. The recording medium of Claim 1, wherein

a movie-mode program and an enhanced-mode
program are executed by two or more execution modules,

the two or more execution modules are resident
programs on a same layer in a control hierarchy, and

15 the playback control procedure is described
using a function supplied from the control hierarchy
layer.

5. The recording medium of Claim 4, wherein

20 the supplied function is one of (1) a function
for having a playback device execute a playback control
based on a predefined playback path, (2) a function for
setting a predetermined value to a register in the
playback device, and (3) a function for acquiring the
25 value set to the register.

6. The recording medium of Claim 5, wherein

the branching is to branch from the movie-mode program to the enhanced-mode program,

5 the playback control procedure performed by the movie-mode program is to set the predetermined value to the register, and

the playback control procedure performed by the enhanced-mode program is a process conducted with
10 reference to the predetermined value.

7. The recording medium of Claim 6, wherein

the value set to the register is a value showing one of (1) an audio setting in the playback device, (2)
15 a subtitle setting in the playback device, (3) an angle setting in the playback device, (4) a currently played title, (5) a currently played chapter, and (6) a current playback point.

20 8. The recording medium of Claim 5, having pieces of playlist information recorded thereon, wherein

each piece of the playlist information defines a playback path by arranging pieces of information showing playback sections in the video data according
25 to a playback order, and

the playback control executed with the supplied function is based on the playback path defined by each piece of the playlist information.

5 9. The recording medium of Claim 8, wherein

each of the plurality of programs includes a function call for calling the supplied function for executing the playback control,

the function call includes two arguments,

10 of the two arguments, a first argument specifies a piece of the playlist information, and

a second argument specifies a starting point in the playback path.

15 10. The recording medium of Claim 9, wherein

the starting point is specified using one of a playback section, a playback time, and a chapter.

11. The recording medium of Claim 8, wherein

20 each piece of the playlist information has a flag attached thereto,

the flag shows that video data playback using the piece of the playlist information to which the flag is attached is allowed either in the movie mode or in
25 the enhanced mode.

12. The recording medium of Claim 8, wherein

the branching is to branch from the movie-mode program to the enhanced-mode program,

5 the playback control procedure performed by the movie-mode program is to specify a starting point in the playback path defined by a piece of the playback information for playback execution, and

10 the playback control procedure performed by the enhanced-mode program is to specify the starting point in the playback path defined by the same piece of the playback information for playback execution.

13. The recording medium of Claim 1, wherein

15 the enhanced mode is a mode for having a virtual machine execute a program, and

an enhanced-mode program is described in a virtual machine-oriented programming language.

20 14. The recording medium of Claim 13, wherein

in the enhanced-mode program, an execution of the playback control procedure is triggered by an event that occurs in a playback device during playback of the video data.

25

15. The recording medium of Claim 14, wherein

the event is one of (1) an event showing that a current playback position has reached a predetermined time point on a playback time axis of the video data, and (2) an event showing that the current playback position has proceeded by a predetermined time interval on the playback time axis.

16. The recording medium of Claim 15, having mark information recorded thereon, wherein

the mark information defines the predetermined time point and the predetermined time interval.

17. The recording medium of Claim 14, wherein

the event shows that a user operation has been performed during a predetermined time period on a playback time axis of the video data.

18. The recording medium of Claim 17, wherein

the user operation shows that fast-forwarding, rewinding, or pausing has been instructed during playback of the video data.

19. The recording medium of Claim 13, wherein

a movie-mode program includes a button command,

the button command is a command for branching to the enhanced-mode program, and is recorded on the recording medium as a multiplexed stream after being multiplexed with the video data and subtitle data, and

5 each piece of the subtitle data is image data of a button, and the button command is executed when a confirmation operation is conducted with respect to the image data of the button.

10 20. The recording medium of Claim 1, wherein

the enhanced mode is a mode for having a browser execute a program, and

an enhanced-mode program is described in a markup language.

15 21. The recording medium of Claim 20, wherein

a movie-mode program includes a button command,

20 the button command is a command for branching to the enhanced-mode program, and is recorded on the recording medium as a multiplexed stream after being multiplexed with the video data and subtitle data, and

25 each piece of the subtitle data is image data of a button, and the button command is executed when a confirmation operation is conducted with respect to the image data of the button.

22. The recording medium of Claim 1, wherein

the enhanced mode includes a virtual-machine mode for having a virtual machine execute one or more of the enhanced-mode programs and a browser mode for having a browser execute one or more of the enhanced-mode programs, and

the branching is to branch between a program in the virtual-machine mode and a program in the browser mode.

23. A playback device relating to a recording medium having video data, a plurality of programs, and a table including indexes pertaining to the respective plurality of programs recorded thereon, comprising:

a plurality of modules operable to execute the respective plurality of programs, the plurality of modules including a module corresponding to a movie mode and a module corresponding to an enhanced mode; and

a manager operable to control branching between the plurality of programs, wherein

the table is information showing that each of the plurality of programs belongs to either a movie mode or an enhanced mode,

the branching is described, for each of the plurality of programs, using indirect referencing via the table, and

the manager decides, at a time of the branching,
5 a module for executing a program of a branch destination by referring to the table.

24. The playback device of Claim 23, wherein

the indexes included in the table correspond
10 one-to-one with the plurality of programs,

the indexes show that the plurality of corresponding programs respectively belong to either the movie mode or the enhanced mode, and

the indirect referencing is to specify the
15 program of the branch destination by using labels relating to the indexes.

25. The playback device of Claim 24, wherein

the decision by the manager is made by
20 identifying an index to which the label is allocated and by judging the identified index belongs to either the enhanced mode or the movie mode.

26. The playback device of Claim 25, wherein

25 in a case where a program execution by the

enhanced-mode corresponding module is impossible, the manager has the movie-mode corresponding module execute an alternative movie-mode program, even if the label is allocated to an index belonging to the enhanced mode,

5 the table includes a reserved index, and
 the alternative movie-mode program corresponds to the reserved index.

27. The playback device of Claim 23, further
10 comprising:

 a register; and

 a playback control engine operable to perform a functional operation in response to a function call from each of the movie-mode and the enhanced-mode
15 corresponding modules, wherein

 the functional operation is one of (1) receiving a value from one of the modules and setting the value to the register, (2) acquiring the value from the register and passing the value over to one of the
20 modules, and (3) playing the video data according to a predetermined playback path.

28. The playback device of Claim 27, wherein

 the branching is to branch from a movie-mode
25 program to an enhanced-mode program,

a playback control procedure performed by the movie-mode program is to have the playback control engine set the value to the register, and

the playback control procedure performed by the enhanced-mode program is to have the playback control engine read the value to the register.

29. The playback device of Claim 28, wherein

the value set to the register is a value showing one of (1) an audio setting in the playback device, (2) a subtitle setting in the playback device, (3) an angle setting in the playback device, (4) a currently played title, (5) a currently played chapter, and (6) a current playback point.

15

30. The playback device of Claim 28, wherein

pieces of playlist information are recorded on the recording medium,

each piece of the playlist information defines a playback path by arranging pieces of information showing playback sections in the video data according to a playback order, and

a playback control executed by the playback control engine is based on the defined playback path.

25

31. The playback device of Claim 30, wherein

each of the plurality of programs includes a
function call for calling the functional capability of
playing the video data performed by the playback
5 control engine,

the function call includes two arguments,

of the two arguments, a first argument specifies
a piece of the playlist information, and

a second argument specifies a starting point in
10 the playback path.

32. The playback device of Claim 31, wherein

the starting point is specified using one of a
playback section, a playback time, and a chapter.

15

33. The playback device of Claim 31, wherein

each piece of the playlist information has a
flag attached thereto,

the flag shows that video data playback using
20 the piece of the playlist information to which the flag
is attached is allowed either in the movie mode or in
the enhanced mode, and

the playback control engine performs the
playback control based on the piece of the playlist
25 information at a time when the mode shown by the flag

is being executed.

34. The playback device of Claim 31, wherein

the branching is to branch from the movie-mode
5 program to the enhanced-mode program,

the playback control procedure performed by the
movie-mode program is to specify the starting point and
have the playback control engine perform playback, and

the playback control procedure performed by the
10 enhanced-mode program is to specify the same starting
point in the playback path and have the playback
control engine perform playback.

35. The playback device of Claim 23, wherein

15 the movie-mode corresponding module has a
virtual machine, and

an enhanced-mode program is described in a
virtual machine-oriented programming language.

20 36. The playback device of Claim 35, further
comprising:

a playback control engine operable to perform a
functional operation in response to a function call
from each of the movie-mode and the enhanced-mode
25 corresponding modules, wherein

the playback control engine causes an occurrence of an event synchronized with video data playback,

the enhanced-mode program includes an event handler, and

5 the enhanced-mode corresponding module executes the event handler when the playback control engine causes the event occurrence.

37. The playback device of Claim 36, wherein

10 the event is one of (1) an event showing that a current playback position has reached a predetermined time point on a playback time axis of the video data, and (2) an event showing that the current playback position has proceeded by a predetermined time interval
15 on the playback time axis.

38. The playback device of Claim 37, wherein

mark information is recorded on the recording medium,

20 the mark information defines the predetermined time point and the predetermined time interval, and

the event occurrence is caused based on the mark information.

25 39. The playback device of Claim 36, further

comprising:

a receiving unit operable to receive a user operation, wherein

the event shows that the receiving unit has
5 received the user operation during a predetermined time period on a playback time axis of the video data.

40. The playback device of Claim 39, wherein

the user operation includes fast-forwarding,
10 rewinding, and pausing during the video data playback.

41. The playback device of Claim 35, comprising:

a demultiplexer operable to demultiplex a multiplex stream to obtain a button command, the video
15 data, subtitle data;

an image decoder operable to decode image data of a button; and

a video decoder operable to decode the video data, wherein

20 a movie-mode program includes the button command,

the button command is a command for branching to the enhanced-mode program, and is recorded on the recording medium as the multiplex stream after being multiplexed with the video data and the subtitle data,

25 each piece of the subtitle data is the image

data, and

the movie-mode corresponding module executes the button command when a confirmation operation is conducted with respect to the image data.

5

42. The playback device of Claim 23, wherein

the enhanced mode is a mode for having a browser execute a program, and

an enhanced-mode program is described in a
10 markup language.

43. The playback device of Claim 42, comprising:

a demultiplexer operable to demultiplex a
multiplex stream to obtain a button command, the video
15 data, subtitle data;

an image decoder operable to decode image data
of a button; and

a video decoder operable to decode the video
data, wherein

20 a movie-mode program includes the button command,

the button command is a command for branching to
the enhanced-mode program, and is recorded on the
recording medium as the multiplex stream after being
multiplexed with the video data and the subtitle data,

25 each piece of the subtitle data is the image

data, and

the movie-mode corresponding module executes the button command when a confirmation operation is conducted with respect to the image data.

5

44. The playback device of Claim 23, wherein

the enhanced mode includes a virtual-machine mode for having a virtual machine execute one or more of the enhanced-mode programs and a browser mode for
10 having a browser execute one or more of the enhanced-mode programs, and

the branching is to branch between a program in the virtual machine mode and a program in the browser mode.

15

45. A playback processing program relating to a recording medium having video data, a plurality of programs, a table including indexes pertaining to the respective programs recorded thereon, comprising the
20 following processing:

having a computer perform a plurality of execution steps in each of which one of the plurality of programs is executed, and a control step for controlling branching between the plurality of programs,
25 the plurality of execution steps including an execution

step corresponding to a movie mode and an execution step corresponding to an enhanced mode, wherein

the table is information showing that each of the plurality of programs belongs to either a movie
5 mode or an enhanced mode,

the branching is described, for each of the plurality of programs, using indirect referencing via the table, and

the control step is a step for deciding, at a
10 time of the branching, an execution step for executing a program of a branch destination by referring to the table.

46. A playback method relating to a recording medium
15 having video data, a plurality of programs, a table including indexes pertaining to the respective programs recorded thereon, comprising the following steps:

a plurality of execution steps in each of which one of the plurality of programs is executed, the
20 plurality of execution steps including an execution step corresponding to a movie mode and an execution step corresponding to an enhanced mode; and

a control step for controlling branching between the plurality of programs, wherein

25 the table is information showing that each of

the plurality of programs belongs to either a movie mode or an enhanced mode,

the branching is described, for each of the plurality of programs, using indirect referencing via the table, and

the control step is a step for deciding, at a time of the branching, an execution step for executing a program of a branch destination by referring to the table.

47. A recording method of a recording medium, comprising the following steps:

creating application data; and

recording the created application data on the recording medium, wherein

the application data includes video data, a plurality of programs, and a table,

each of the plurality of programs shows a playback control procedure of the video data,

the table includes (1) identification information of each of the plurality of programs, and (2) information showing that each of the plurality of programs belongs to either a movie mode or an enhanced mode,

one of the plurality of programs includes a

command for branching, and

the branching command specifies a branch destination using indirect referencing via the table.